Limited Soils Investigation
Relocation of Water Tank
Southwest Corner of Normandie Ave.
and 190th Street
Los Angeles, California

NorCal Engineering
Soils and Geotechnical Consultants

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Los Angeles, California

Project Number 5936-96
May 13, 1997

NorCal Engineering

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SOILS AND GEOTECHNICAL CONSULTANTS
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May 13, 1997 Project Number 5936-96

McDonnell Douglas Realty Company
4060 Lakewood Boulevard
Lakewood, California 90808

Attn: Mr. Johnny Marasco

RE: Limited Soils Investigation - Proposed Relocation of Water Tank - Located Within the Proposed Harbor Gateway Center - Southwest Corner of Normandie Avenue and 190th Street, in the City of Los Angeles, California

Dear Mr. Marasco:

Pursuant to your request, this firm has performed a Limited Soils Investigation for the above referenced project in accordance with your authorization. The purpose of this investigation is to evaluate the geotechnical conditions of the subject site and to provide soil bearing capacity recommendations for the proposed water tank relocation. This soils engineering report presents the finding of our study along with conclusions and recommendations for development.

We appreciate this opportunity to be of service to you. If you have any further questions, please don not hesitate to contact the undersigned.

Respectfully submitted,
NORCAL ENGINEERING

Keith D. Tucker
Project Engineer
R.G.E. 841

Troy D. Norrell
President

Structural Considerations

This geotechnical engineering report presents the findings of our study along with engineering analysis and recommendations for the proposed improvements. It is proposed to relocate a 270,000 gallon water tank from the northeast corner of the property to a location near the southeast corner of the site, as shown on the attached plan. The tank will be placed on top of the existing pavement section already in place in the area. Total loads of the new tank will not exceed 1,300 psf. Final building plans shall be reviewed by this firm prior to submittal for city approval to determine the need for any additional study and revised recommendations pertinent to the proposed development, if necessary.

Site Description

The proposed tank relocation area is currently being used as an equipment storage area and is covered by asphaltic concrete pavement. The pavement was noted to be in relatively good condition.

Field Investigation

The purpose of the investigation was to explore the subsurface conditions and to provide preliminary geotechnical engineering design parameters for the relocated tank. The investigation consisted of the placement of one subsurface exploratory boring by hand auger to a maximum depth of 12 feet placed at an accessible place in the new tank location. The existing pavement was cored in order to gain access to the underlying subgrade soils. The exploration was visually classified and logged by a field engineer with the location of the subsurface exploration shown on the attached Site Plan.

The exploratory boring revealed the shallow earth materials to consist of approximately one foot of fill soils classifying as silty CLAY with gravel overlying stiff native soils also classifying as silty CLAY. Sand content increased with depth of exploration and clay content decreased. The existing pavement section was measured at 3.5 inches of asphaltic concrete overlying 8 inches of base material. No groundwater was encountered and no caving occurred.

Laboratory Tests

Relatively undisturbed samples of the subsurface soils were obtained to perform laboratory testing and analysis for direct shear and to determine in-place moisture/densities. These undisturbed samples consisted of one inch rings with inside diameter of 2.5 inches. Bulk bag samples were obtained in the upper soils for maximum density tests.

A. The field moisture content (ASTM:D 2216) and the dry density of the ring samples were determined in the laboratory. This data is listed on Table I.

B. Maximum density tests (ASTM: D-1557-78) were performed on typical samples of the upper soils. Results of these tests are shown on Table II.

C. Direct shear tests (ASTM: D-3080) were performed on undisturbed and disturbed samples of the subsurface soils. These tests were performed to determine parameters for the calculation of the safe bearing capacity. The test is performed under saturated conditions at loads of 500 lbs./sq.ft., 1,000 lbs./sq.ft., and 2,000 lbs./sq.ft. with results shown on Plate A.

E. Consolidation tests (ASTM: D-2435) were performed on undisturbed samples to determine the differential and total settlement which may be anticipated based upon the proposed loads. Water was added to the samples at a surcharge of one KSF and the settlement curves are plotted on Plate B.

CONCLUSIONS AND RECOMMENDATIONS

It is recommended that site inspections be performed when necessary by a representative of this firm during development to verify the findings and recommendations documented in this report. Any unusual conditions which may be encountered in the course of the project development may require the need for additional study and revised recommendations.

Foundation Design

We understand that the existing pavement section and underlying soils will provide support for the 270,000 gallon water tank. A safe bearing capacity of 1,500 psf may be used in design of the tank foundation system.

Settlement Analysis

Resultant pressure curves for the consolidation tests on the upper soils only are shown on Plate B. Computations utilizing these curves and the recommended safe bearing capacities reveal that the supporting soils will experience settlements on the order of 1/2 inch and differential settlements of less than 1/4 inch.

Closure

The recommendations and conclusions contained in this report are based upon the soil conditions uncovered in our test excavations. No warranty of the soil condition between our excavations is implied. NorCal Engineering should be notified for possible further recommendations if unexpected to unfavorable conditions are encountered during construction phase. It is the responsibility of the owner to ensure that all information within this report is submitted to the Architect and appropriate Engineers for the project.

This firm should have the opportunity to review the final plans to verify that all our recommendations are incorporated. This report and all conclusions are subject to the review of the controlling authorities for the project.

This limited soils investigation has been conducted in a manner consistent with the level of care and skill exercised by members of our profession currently practicing under similar conditions in the Southern California area. No other warranty, expressed or implied is made.

MAJOR DIVISIONS			SYMBOLS	TYPICAL NAMES
COARSE GRAINED SOILS (MORE THAN 50% OF MATERIAL IS LARGER THAN 200 SIEVE SIZE)	GRAVELS (MORE THAN 50% OF COARSE FRACTION IS LARGER THAN THE NO. 4 SIEVE SIZE)	CLEAN GRAVELS (LITTLE OR NO FINES)	GW	WELL GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES.
			GP	POORLY GRADED GRAVELS OR GRAVEL - SAND MIXTURES, LITTLE OR NO FINES.
		GRAVELS WITH FINES (APPRECIABLE AMT. OF FINES)	GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES.
			GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES.
	SANDS (MORE THAN 50% OF COARSE FRACTION IS SMALLER THAN THE NO. 4 SIEVE SIZE)	CLEAN SANDS	SW	WELL GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES.
			SP	POORLY GRADED SANDS OR GRAVELLY SANDS, LITTLE OR NO FINES.
		SANDS WITH FINES (APPRECIABLE AMT. OF FINES)	SM	SILTY SANDS, SAND - SILT MIXTURES.
			SC	CLAYEY SANDS, SAND - CLAY MIXTURES.
FINE GRAINED SOILS (MORE THAN 50% OF MATERIAL IS SMALLER THAN 200 SIEVE SIZE	SILTS AND CLAYS (LIQUID LIMIT LESS THAN 50)		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY.
			CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS.
			OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS
	SILTS AND CLAYS (LIQUID LIMIT MORE THAN 50)		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOILS, ELASTIC SILTS.
			CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
			OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS.
HIGHLY ORGANIC SOILS			PT	PEAT AND OTHER HIGHLY ORGANIC SOILS

BOUNDARY CLASSIFICATIONS: SOILS POSSESSING CHARACTERISTICS OF TWO GROUPS ARE DESIGNATED BY COMBINATIONS OF GROUP SYMBOLS

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UNIFIED SOIL CLASSIFICATION SYSTEM

PROJECT | DATE

MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	DESCRIPTION OF SUBSURFACE MATERIALS	ELEVATION (FEET)
					THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF ACTUAL CONDITIONS ENCOUNTERED.	
16.6	117.2		R	0	3½ inches PAVEMENT SECTION over 8 inches of BASE MATERIAL	
19.3	107.7		R/B		FILL SOILS CLAY with gravel, brown, medium stiff, moist	
18.0	106.9		R	5		
15.6	102.0		R		NATIVE SOILS Silty CLAY, dark brown, stiff, moist	
17.3	98.7		R			
10.3	107.9		R	10	SILT, sandy with clay, light brown, moist, dense, decreasing clay content with depth	
11.0	100.7		R		SAND, fine grained, silty, light brown, damp, dense	
				15		
				20		
				25		
				30		
				35		

SAMPLE TYPES

- [C] Rock Core
- [S] Standard Split Spoon
- [R] Ring Sample
- [B] Bulk Sample
- [J] Jar Sample

DATE DRILLED: 5/8/97
EQUIPMENT USED: Hand Auger
GROUNDWATER LEVEL: Not encountered

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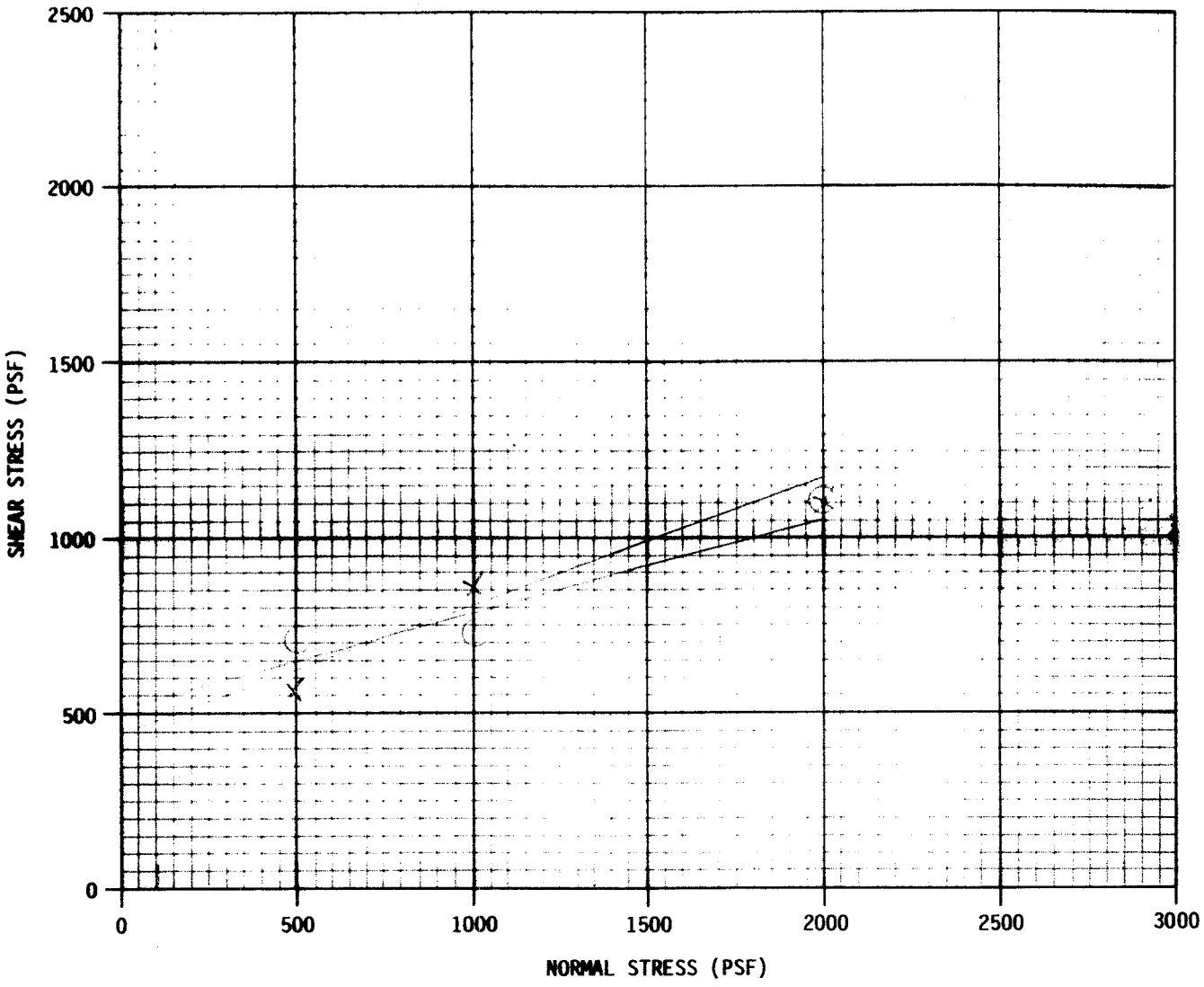
LOG OF BORING #1

PROJECT 5936-96 **DATE**

TABLE I
MAXIMUM DENSITY TESTS
(ASTM: D-1557-78)

Sample	Classification	Optimum Moisture	Maximum Dry Density (lbs./cu.ft.)
B1 @ 1-3'	silty CLAY	12.0	120.0



SYMBOL	BORING NUMBER	DEPTH (FEET)	ø (DEGREES)	C (PSF)	DRY DENSITY (PCF)	MOISTURE CONTENT (%)
X	1	2.5	19	450	107.7	19.3
O	1	4.0	14	525	106.9	18.0
△						
□						

NOTE: TESTS PERFORMED ON SATURATED SAMPLES UNLESS SHOWN BELOW.
(FM) FIELD MOISTURE
TESTS PERFORMED ON UNDISTURBED SAMPLES UNLESS SHOWN BELOW.
(R) SAMPLES REMOLDED AT 90% OF MAXIMUM DRY DENSITY

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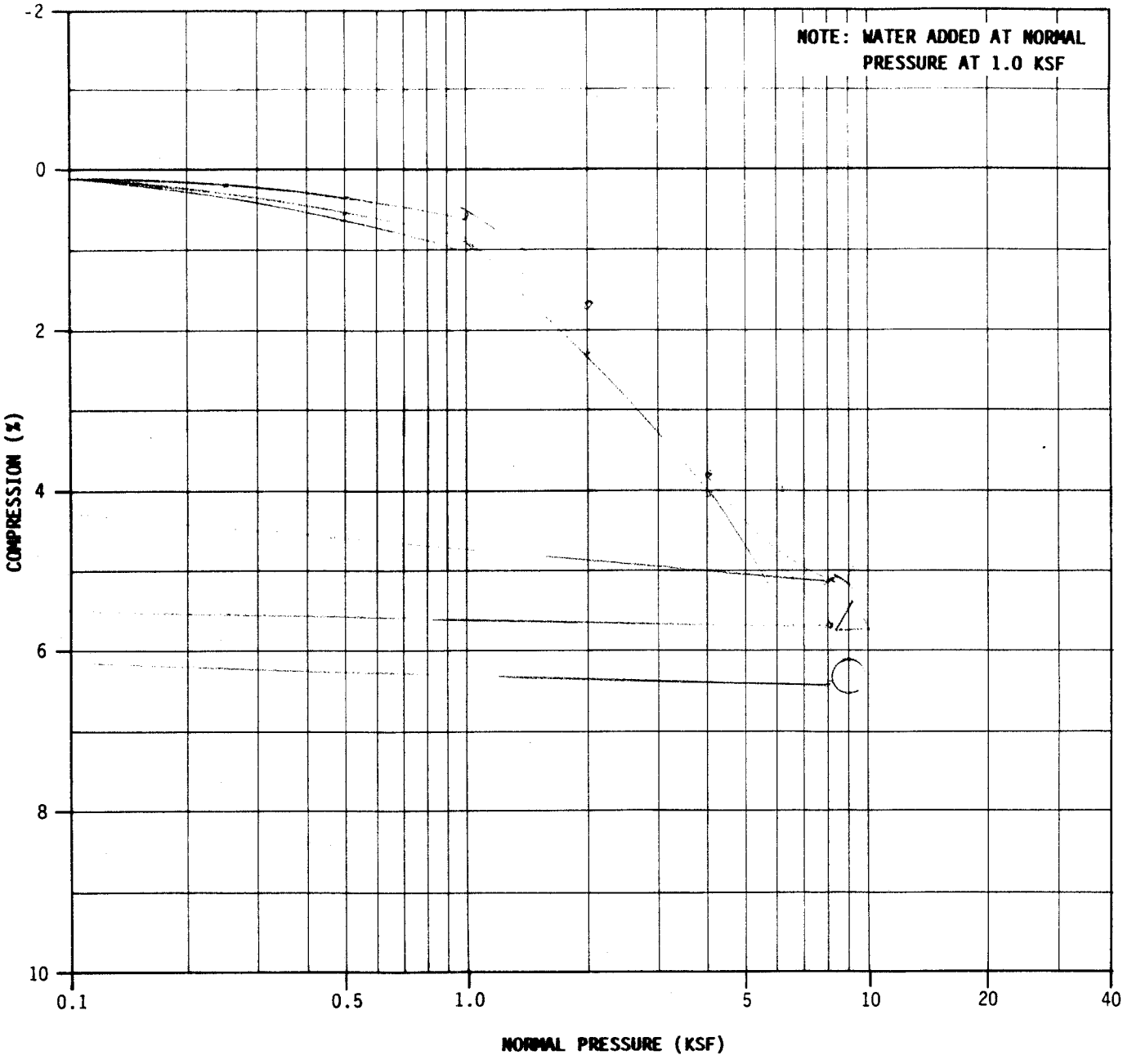
DIRECT SHEAR TEST RESULTS
Plate A



SYMBOL	BORING NUMBER	DEPTH (FEET)	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)
X	1	4.0	106.9	18.0		
O	1	8.0	98.7	17.3		
△	1	12.0	100.7	11.0		
□						

——— COMPRESSION (FM) FIELD MOISTURE - NO WATER ADDED

– – – REBOUND (R) SAMPLE REMOLDED AT 90% OF MAXIMUM DRY DENSITY

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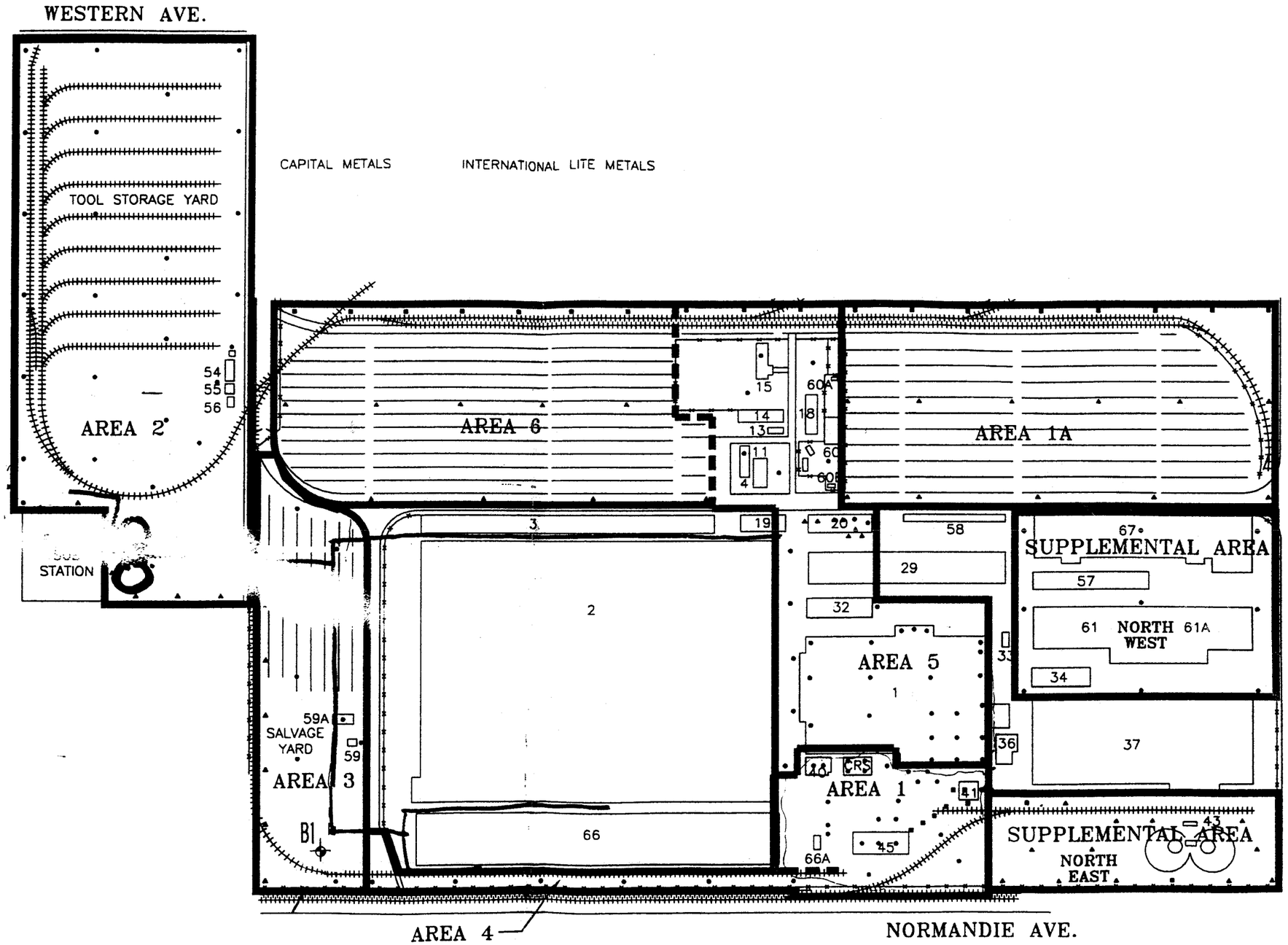
CONSOLIDATION TEST RESULTS

Plate B



0 200 400
Approximate Scale: 1"=200'

N

LEGEND
- 10' Deep
- 25' Deep
- 50' Deep

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APPROXIMATE LOCATION OF FIELD EXPLORATIONS

FIGURE 1
February 6, 1997